Unit 1: Pure Substances and Mixtures

Vocabulary

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| --- | --- | --- | --- |
| Liquid | Solid | Saturated Solution | Matter |
| Homogeneous Mixture | Pure substances | Gas | Unsaturated Solution |
| Volume | Heterogeneous Mixtures | Solution | Insoluble |
| Dissolve | Soluble | Diluted Solution | Solute |
| Solvent | Distillation | Concentration |  |

Major Concepts

1. Matter and the Particle Theory of Matter
2. Three states of matter- Solid, Liquid, Gas
3. Changes in the State of Matter
4. Pure substances and Mixtures
5. Mechanical mixtures and solutions
6. Solutes & Solvents🡪 Water, the universal solvent
7. Separating Mechanical Mixtures🡪 Sorting. Floating & Settling/ Magnet/ Sieves & Filters
8. Separating solutions 🡪 Evaporation vs. distillation

Questions

1. Use the particle theory to explain why water changes from solid (ice) to a liquid (water) when it is heated.
2. What is a pure substance? Give three examples.
3. Is milk a pure substance or a mixture? Explain how you know.
4. Describe each of the following types of mixtures:
   1. A mechanical mixture
   2. A solution
5. What is the difference between the arrangement of the different particles of a mechanical mixture and the arrangement of the different particles of a solution.
6. Ocean water is a solution. It contains 96% water, 4% salt, and very small amounts of other salts and minerals.
   1. What is the solvent in ocean water?
   2. What are the solutes in ocean water?
7. List one solution that is a solid, one solution that is a liquid and one solution that is a gas. For each solution, describe the solvent and the solute.
8. How is water an important solvent in the body?
9. What is pollution? Name 4 ways that pollutants enter water.
10. Drink crystals are a mixture of sugar, flavour particles, and colouring particles. The crystals dissolve in water.
    1. What is the solute in this solution? What is the solvent?
    2. What happens to the different particles as the crystals dissolve in water particles?
11. Describe the two ways to separate sugar from a sugar- and- water mixture.
12. Meghan has a mixture of sawdust, gravel, and salt. Describe how Meghan can separate her mixture.

Unit 2: Interactions in the Environment

Vocabulary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Biotic | Organism | Predator | Producer | Species |
| Population | Community | Prey | Consumer | Abiotic |
| Ecosystem | Mutualism | Herbivore | Habitat | Decomposer |
| Competition | Photosynthesis | Carnivore | Scavenger | Omnivore |
| Detrivore |  |  |  |  |

Major Concepts

1. What is an ecosystem? 🡪 individual/ population/ community
2. Abiotic vs. biotic parts of the environment
3. The needs of living things🡪 Sunlight/ air/ water/ food/ ideal temperature
4. Competition/ predation/ mutualism
5. Producers/ consumers/ detrivores/ decomposers
6. Food chains & Food webs
7. Energy flow in an ecosystem🡪 Pyramid of numbers
8. Matter cycle🡪 The Carbon Cycle & The Water Cycle
9. Succession 🡪 Primary vs. Secondary
10. Human impacts of Ecosystems 🡪 Habitat loss & Biodiversity/ Invasive Species

Questions

1. What are the essential abiotic elements of an ecosystem?
2. What is the difference between a habitat and an ecosystem?
3. For each of the following, state two ways that they are important to life: sunlight, earth (soil), water, and air.
4. What role does temperature play in an ecosystem?
5. Give an example of a producer and a consumer and state the difference between them.
6. Create a simple food chain with four species involved.
7. Describe two factors that limit the number of living things in a given environment.
8. Explain how the energy you obtain from eating a hamburger came from the sun.
9. Predator- prey interactions are very important to a healthy ecosystem. Demonstrate this using a specific example.
10. Describe the flow of energy in a food chain. What would happen to this flow if any part of the food chain were eliminated?
11. Explain how competition limits the number of organisms that can survive in an ecosystem.
12. What would happen if an ecosystem of dead organisms did not decompose?
13. List the four different roles played within an ecosystem. Include an example of each.
14. Preserving, conserving and restoring are three methods of helping to prevent habitat loss. Give an example of each.
15. Explain in your won words the meaning of sustainability.
16. Define “succession” in your own words and give examples of primary and secondary succession.
17. List some ways that we can protect our natural habitats from invasive species.

Unit 3: Heat in the Environment

Vocabulary

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| --- | --- | --- | --- |
| Heat | Kinetic Energy | Thermal Energy | Temperature |
| Thermal Expansion | Thermal Contraction | Metamorphic Rock | Conduction |
| Geothermal Energy | Igneous Rock | Radiant Energy | Radiation |

Major Concepts

1. The particle theory of matter
2. Scientific meaning of HEAT
3. Changes of state as it relates to temperature and kinetic energy
4. Thermal expansion and thermal contraction
5. Conduction 🡪 examples from geological processes
6. Radiation

Questions

1. Summarize the key ideas of the particle theory in your own words or with a labeled diagram
2. How does the particle theory help to explain the different between a drop of cold water and a drop of hot water?
3. Explain what is wrong with the statement “A mug of hot chocolate contains more heat than a glass of cold water”.
4. Name and briefly describe two kinds of energy that all particles possess
5. Describe the relationship between temperature and energy
6. When a substance is cooled, what happens to its particles? How does cooling affect the volume of a substance?
7. A metal entrance door swings freely in the winter, but when the weather turns warm, the door sticks and seems too big for the doorframe. Using your knowledge of the particle theory, explain what is happening.
8. You want to inflate an air mattress to use in a swimming pool on a hot summer day. Should you fill the mattress with as much air as possible? Why or why not?
9. In your own words, explain how thermal energy is transferred by conduction.
10. List one material that is a good conductor and one that is a good insulator. Suggest one use for each material.
11. Describe the formation of rocks due to conduction of geothermal energy within the Earth.

Unit 4: Form & Function

Vocabulary

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| --- | --- | --- | --- | --- |
| Structure | Weight | Dynamic Load | Tension | Arch |
| Function | Load | Solid Structure | Shear | Corrugation |
| Form | Dead Load | Frame Structure | Stability | Force |
| Live Load | Shell Structure | Cantilever | Beam | Gravit |
| Compression | External Force | Dome | Truss | Mass |
| Torsion | Internal Force |  |  |  |

Major Concepts

1. Form vs. Function of a structure
2. Forces🡪 Gravity/ mass/ weight
3. Load🡪 Live load vs. dead load
4. Classifying structures 🡪 solid structures/ frame structures. Shell structures. Combination structures
5. Internal (torsion/Compression/Tension/Shear) vs. External forces
6. Stability and center of gravity
7. Corrugation/ rebar/ cantilever
8. Tie/ strut/ gusset
9. The truss/ arch/ dome

Questions

1. Clearly distinguish between external and internal forces. Give examples of each
2. Identify and describe the three factors that could determine the ability of a structure to support a load and that can cause a structure to fail.
3. Briefly list 4 ways that a beam can be strengthened.
4. Concrete is one of the basic materials used in modern structures
   1. How does concrete react to compression and tension forces?
   2. How do engineers strengthen concrete?
5. Classify each of these examples as applications of the four internal forces:
   1. Sitting on a cushion
   2. Ripping a piece of paper in two
   3. Stretching an elastic band
   4. A sweater twisted in a clothes dryer
6. The International Space Station uses the truss as a framework for the entire station. Why is a truss such a useful structure in this situation?
7. What is the relationship between the arch and the dome?
8. Describe the dead load and live load that acts on each of the following structures
   1. A set of stairs at school
   2. Bleachers in the school gym
9. Clearly state the difference between a fully supported beam and a cantilever, and provide two examples of each.